

CLAIMS

1. A fluorine-containing vinyl ether represented by the formula 1,



wherein R represents an organic group comprising at least one
5 fluorine atom and a cyclic structure.

2. A fluorine-containing vinyl ether according to claim 1, wherein the organic group comprises:

(a) the cyclic structure that is selected from the group consisting of
10 cyclopentane ring, cyclohexane ring, norbornene ring, aromatic rings, tricyclodecane ring; and

(b) at least one substituent that is selected from the group consisting of $(-\text{OH})_m$, $(-\text{R}^1)_n$, and $-\text{COOR}^4$

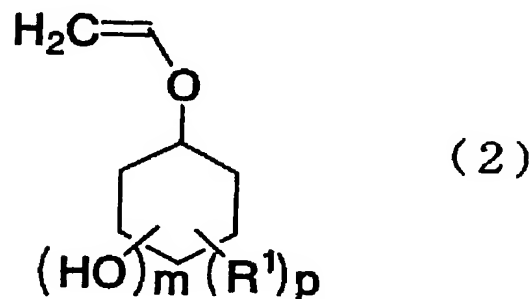
where R^1 is at least one substituent selected from the group consisting
15 of $-\text{F}$, $-\text{CF}_3$, and $-\text{R}^2\text{C}(\text{CF}_3)_2\text{OR}^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group,

R^4 is H, a C_1 - C_{15} alkyl group, or a C_1 - C_{15} substituent containing an ether bond, and

m is 0 or 1, and n is an integer of 1-8.

20

3. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by the formula 2,

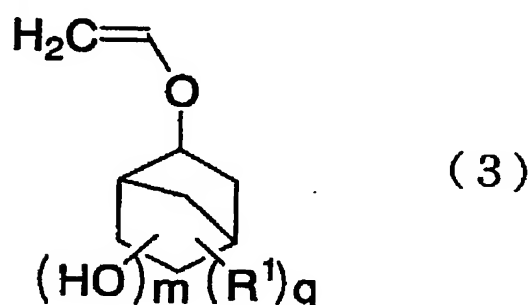


where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

p is an integer of 1-5, and m is 0 or 1.

5

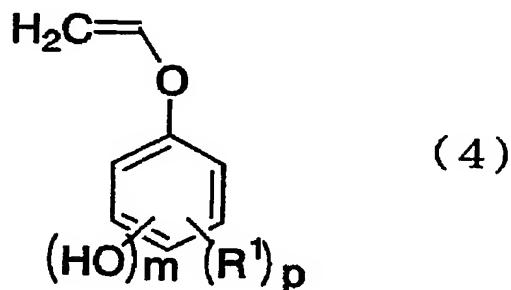
4. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by the formula 3,



- where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

q is an integer of 1-4, and m is 0 or 1.

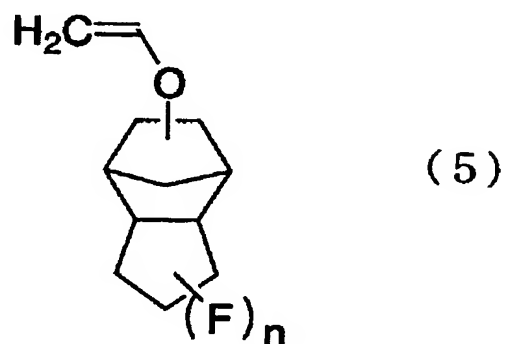
5. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by the formula 4,



where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

p is an integer of 1-5, and m is 0 or 1.

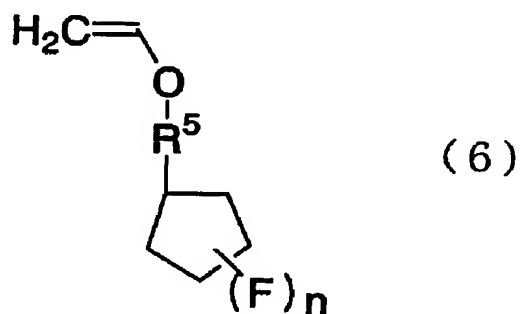
6. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by the formula 5,



5

where n is an integer of 1-8.

7. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by the formula 6,



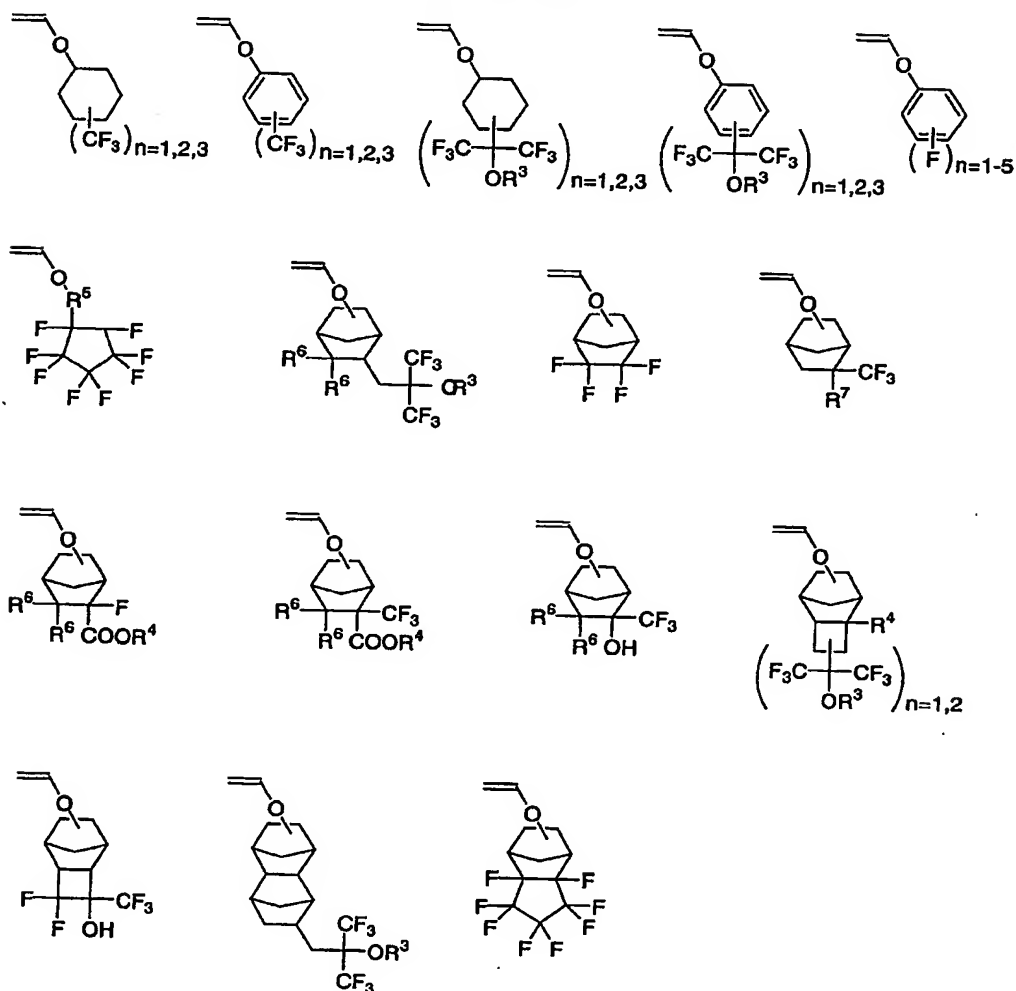
10

where R⁵ is a C₀-C₅ alkyl group, and n is an integer of 1-8.

8. A fluorine-containing vinyl ether according to claim 1 or 2, which comprises a hexafluoroisopropanol unit represented by the formula 7,



9. A fluorine-containing vinyl ether according to claim 1 or 2, which is represented by one of the following formulas:



5

where R^3 is H or an acid-labile protecting group;

R^4 is H, a $\text{C}_1\text{-C}_{15}$ alkyl group, or a $\text{C}_1\text{-C}_{15}$ substituent having an ether bond;

R^5 is a C_0 - C_5 alkyl group;

R^6 is H or F; and

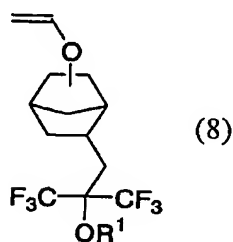
R^7 is CF_3 , OH, CO_2H , CO_2R^8 , or $OCOR^8$ where R^8 is C_1 - C_{15} alkyl group.

5

10. A fluorine-containing polymer comprising a unit derived from a fluorine-containing vinyl ether according to claim 1 or 2.

11. A resist composition comprising a fluorine-containing polymer
10 according to claim 10.

12. A fluorine-containing copolymer comprising:
a first unit derived from a first monomer that is a fluorine-containing vinyl ether represented by the formula 8:



15

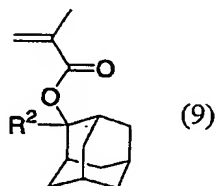
where R^1 is $-H$ or a C_1 - C_8 alkyl group that optionally contains an oxygen atom; and

a second unit derived from a second monomer that is at least one selected from the group consisting of acrylic esters and methacrylic esters.

20

13. A fluorine-containing copolymer according to claim 12, wherein the second monomer contains an acid-labile protecting group.

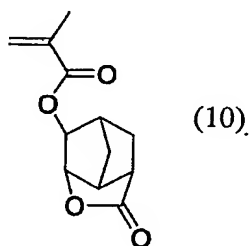
14. A fluorine-containing copolymer according to claim 12 or 13, wherein
25 the second monomer is a first methacrylic ester represented by the general formula 9:



where R^2 is $-\text{CH}_3$ or $-\text{CH}_2\text{CH}_3$.

15. A fluorine-containing copolymer according to claim 12, wherein the
 5 second monomer is an acrylic or methacrylic ester comprising a lactone ring.

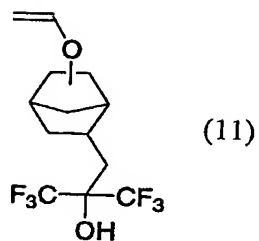
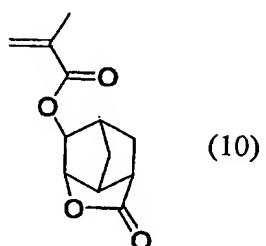
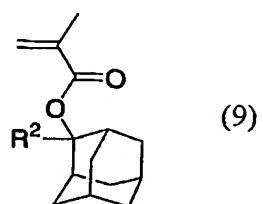
16. A fluorine-containing copolymer according to claim 12 or 15, wherein
 the second monomer is a second methacrylic ester represented by the formula
 10:



10

17. A fluorine-containing copolymer according to claim 12, wherein the
 second monomer is a combination of first and second methacrylic esters
 represented by the formulas 9 and 10, and

- 15 wherein the fluorine-containing vinyl ether is represented by the
 formula 11,



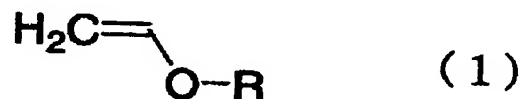
where R² is -CH₃ or -CH₂CH₃.

18. A resist composition comprising a fluorine-containing copolymer
5 according to claim 12 or 13.

AMENDED CLAIMS

[received by the International Bureau on 8 April 2004 (08.04.04)
original claim 2 has been cancelled; original claims 1 and 3-10 have been amended.
other claims remain unchanged (7 page)]

1. (amended) A fluorine-containing vinyl ether represented by the formula 1,



wherein R represents an organic group comprising:

- 5 (a) the cyclic structure that is selected from the group consisting of cyclopentane ring, cyclohexane ring, norbornene ring, aromatic rings, tricyclodecane ring; and

(b) at least one substituent that is selected from the group consisting of $(-\text{OH})_m$, $(-\text{R}^1)_n$, and $-\text{COOR}^4$

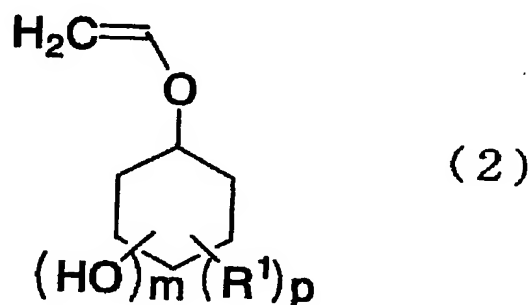
- 10 where R^1 is at least one substituent selected from the group consisting of $-\text{F}$, $-\text{CF}_3$, and $-\text{R}^2\text{C}(\text{CF}_3)_2\text{OR}^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group,

R^4 is H, a $\text{C}_1\text{-C}_{15}$ alkyl group, or a $\text{C}_1\text{-C}_{15}$ substituent containing an ether bond, and

- 15 m is 0 or 1, and n is an integer of 1-8.

2. (canceled)

3. (amended) A fluorine-containing vinyl ether according to claim 1, which is
20 represented by the formula 2,

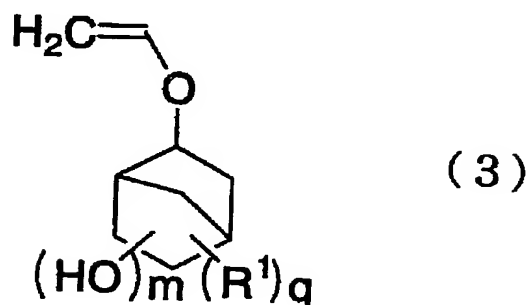


where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

p is an integer of 1-5, and m is 0 or 1.

5

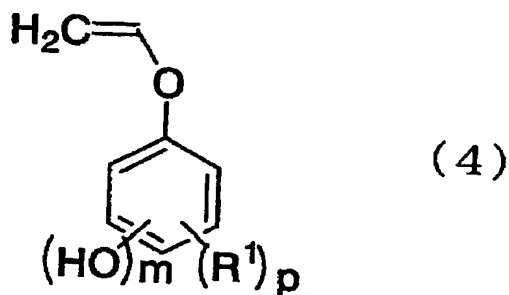
4. (amended) A fluorine-containing vinyl ether according to claim 1, which is represented by the formula 3,



where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

q is an integer of 1-4, and m is 0 or 1.

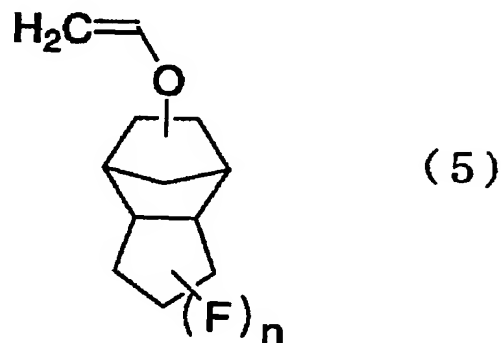
5. (amended) A fluorine-containing vinyl ether according to claim 1, which is represented by the formula 4,



where R^1 is at least one substituent selected from the group consisting of $-F$, $-CF_3$, and $-R^2C(CF_3)_2OR^3$, where R^2 is CH_2 or C_2H_4 , and R^3 is H or an acid-labile protecting group, and

p is an integer of 1-5, and m is 0 or 1.

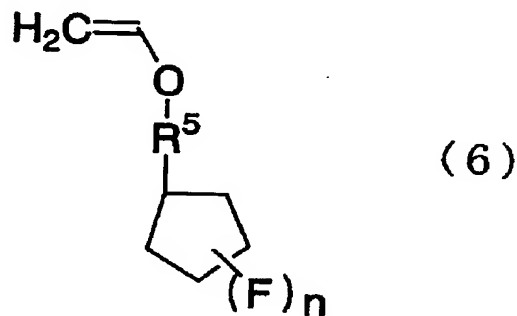
6. (amended) A fluorine-containing vinyl ether according to claim 1, which is represented by the formula 5,



5

where n is an integer of 1-8.

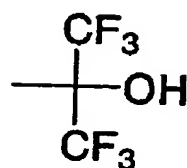
7. (amended) A fluorine-containing vinyl ether according to claim 1, which is represented by the formula 6,



10

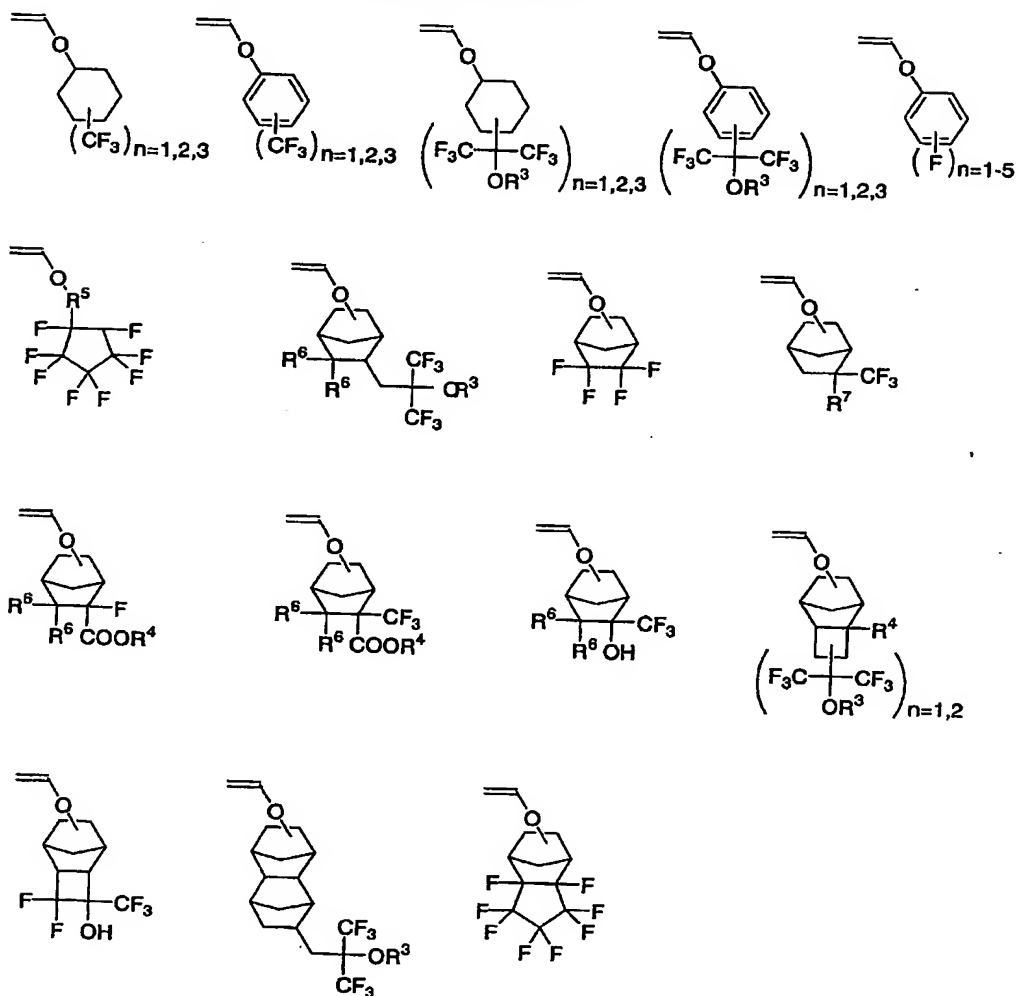
where R⁵ is a C₀-C₅ alkyl group, and n is an integer of 1-8.

8. (amended) A fluorine-containing vinyl ether according to claim 1, which comprises a hexafluoroisopropanol unit represented by the formula 7,



(7).

9. (amended) A fluorine-containing vinyl ether according to claim 1, which is represented by one of the following formulas:



5

where R^3 is H or an acid-labile protecting group;

R^4 is H, a C_1 - C_{15} alkyl group, or a C_1 - C_{15} substituent having an ether bond;

R^5 is a C_0 - C_5 alkyl group;

R^6 is H or F; and

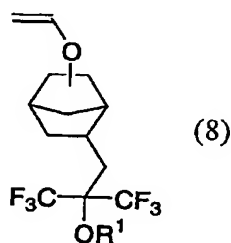
R^7 is CF_3 , OH, CO_2H , CO_2R^8 , or $OCOR^8$ where R^8 is C_1 - C_{15} alkyl group.

5

10. (amended) A fluorine-containing polymer comprising a unit derived from a fluorine-containing vinyl ether according to claim 1.

11. A resist composition comprising a fluorine-containing polymer
10 according to claim 10.

12. A fluorine-containing copolymer comprising:
a first unit derived from a first monomer that is a fluorine-containing vinyl ether represented by the formula 8:



15

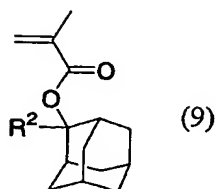
where R^1 is $-H$ or a C_1 - C_8 alkyl group that optionally contains an oxygen atom; and

a second unit derived from a second monomer that is at least one selected from the group consisting of acrylic esters and methacrylic esters.

20

13. A fluorine-containing copolymer according to claim 12, wherein the second monomer contains an acid-labile protecting group.

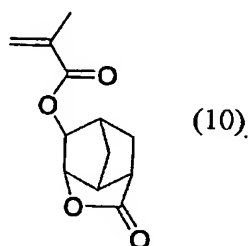
14. A fluorine-containing copolymer according to claim 12 or 13, wherein
25 the second monomer is a first methacrylic ester represented by the general formula 9:



where R^2 is $-\text{CH}_3$ or $-\text{CH}_2\text{CH}_3$.

15. A fluorine-containing copolymer according to claim 12, wherein the
 5 second monomer is an acrylic or methacrylic ester comprising a lactone ring.

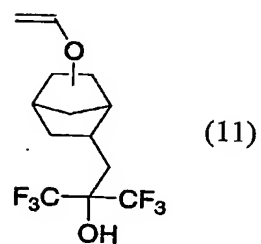
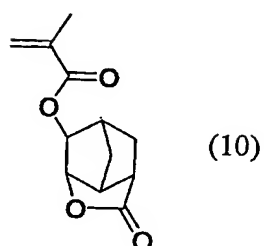
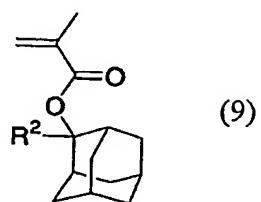
16. A fluorine-containing copolymer according to claim 12 or 15, wherein
 the second monomer is a second methacrylic ester represented by the formula
 10:



10

17. A fluorine-containing copolymer according to claim 12, wherein the
 second monomer is a combination of first and second methacrylic esters
 represented by the formulas 9 and 10, and

15 wherein the fluorine-containing vinyl ether is represented by the
 formula 11,



where R^2 is $-\text{CH}_3$ or $-\text{CH}_2\text{CH}_3$.

18. A resist composition comprising a fluorine-containing copolymer
 5 according to claim 12 or 13.

Brief Statement under Article 19(1)

Claim 1 was amended by incorporating the subject matter of claim 2 into claim 1. Claims 3-9 were amended in a manner to make each of these claims dependent from claim 1. Claim 10 was amended in a manner to delete the citation of claim 2.